

BULK SYSTEM OF HANDLING MILK FROM FARM TO DAIRY

A. C. WOODRUFF

MOJONNIER BROS. CO. CHICAGO, ILLINOIS

Paper presented at Dairy Technology Conference
University of Maryland, College Park, Maryland
Nov. 14, 1951



The increased labor costs on the farms and dairy plants, as well as labor availability, are serious problems facing us today. The increasing emphasis on product quality improvement makes it necessary for every dairy farmer and plant operator to carefully consider new methods which will result in better dairy products.

It is, therefore, not difficult to understand why a new system of handling raw milk on the farm and at the dairy which offers both quality improvement and very substantial savings in operating costs is attractive. It is very unusual that the introduction of a new plan results in attaining both of these most desired features at the same time. However, by installing the Bulk System it is possible for both the milk producer and the Dairy plant operator to realize these very desirable objectives.

The bulk system of handling milk, from farm to plant, received its start in California back in 1938. The California method was to pour the milk from the milk bucket into a dump tank, then pump over a surface cooler and store in an insulated storage tank. This system was very practical where large herds were involved, but was not adaptable to the average-size dairy.

In 1944 our company proposed a method of handling milk in bulk by straining the milk directly into a refrigerated cold wall tank. This greatly simplified the California plan and has proven very satisfactory and acceptable to the average size milk producer.

The first installation of the bulk system in the Eastern section of the country was in Connecticut and in South Carolina in 1948 and 1949. The Connecticut installation used plain tanks with an aerator suspended in the tank whereas the South Carolina installation used all stainless steel cold wall tanks.

Since the Columbia installation in 1949, several additional bulk routes have been started in other areas. The Green Valley Farms route at Haddonfield, N.J., is perhaps one of the most unique in the country. There we pick up milk from small, medium and large producers. By large producers, we mean a producer shipping about 25 cans. Tank sizes on the Green Valley Farm's route vary from 60 to 3000 gallons. At Keota, Iowa, a route was started recently on 'every other day' pickup basis. Most producers on this route had originally shipped to butter plants and they converted to fluid operation on an 'every other day' pickup basis right from the start. Two routes have recently been started on the Frederick, Maryland, area, the milk going to Lucerne Milk Company, Washington, D.C. Additional routes are planned, starting about January 1, in the same area as well as several routes in Northern Virginia.

In addition to the bulk routes already in operation, there are a great number of individual tanks installed on farms all over the United States where bulk routes are not in operation. On these farms the tanks are installed on high legs for

can drawoff or a pump is used to pump the milk into cans for regular can truck pickup. Due to the widespread publicity given to the bulk system and its enthusiastic acceptance by progressive dairymen, many producers who are finding it necessary to make changes in their milk cooling system, either due to obsolescence or expansion, are carefully considering the use of the producers cold wall tank. When bulk routes are established later, they will be in a position to have their milk picked up in bulk and will not have to consider disposing of good can cooling equipment.

There are a number of factors to consider in setting up a bulk route. A most important consideration is the size of the tank. It is easy to understand that the tank must be large enough to take care of peak production; also future increased production should be given careful thought. Since the stainless steel cold wall tanks will last from 20 to 30 years, the size selected should be large enough to meet any future needs. Other factors to consider are the possibility of every-other-day pickup and unusual road conditions where it might be desirable to have the tank hold at least 3 milkings.

When the tank is installed, it is leveled and then calibrated by filling with water in 5 gallon increments. A stainless steel measuring stick is supplied with the tank. A calibration chart is then made and then the readings in inches and fractions on this stick represent pounds of milk in the tank.

With the tank is supplied a Freon combination air and water cooled compressor. This may be installed either in the milk house or outside under suitable protection. The producers cold wall tanks are supplied with various amounts of refrigerated cold wall surface, the area being determined by the tank's size. Construction is similar to the larger cold wall tanks which are used in milk and ice cream plants. Some tanks are equipped with flooded Freon controls and others with thermostatic controls. Some have exterior stainless steel surfaces and others have mild steel exteriors. The milk is poured direct from the milking pail or transfer vessel into a strainer which fits into the lid of the tank. Cooling is very rapid. With normal milking rates, milk is cooled to approximately 38° F. within about 15 minutes after completion of the milking operation. The temperature is thermostatically controlled and the compressor and agitator are shut off when the milk reaches the desired temperature. The milk is then held over night with only a degree or two rise in temperature. The morning milk is then strained directly into the night's milk. The blend temperature does not usually rise above 45° F. and again the milk is cooled to about 38° F. within about 15 minutes of the completion of the milking.

The milk then remains in the tank until the driver arrives for the pickup. Various types and sizes of tank trucks are used. The selection depends upon local conditions such as road conditions, distance of farms from plant, accessibility of dairy houses and the preference of the hauler. At Green Valley Farms in New Jersey a 3000 gallon 2 compartment trailer tank is used. Guernsey milk is placed in one compartment and mixed herd milk in the other. At Edisto Farms Dairy, Columbia, S.C., a 2000 gallon trailer tank is used. At Swaner Farms Dairy in Iowa City, Iowa, we are using a 2000 gallon straight truck tank with tandem rear axel. This works very well under the difficult road conditions in Iowa.

Recently they had a 6" rainfall there and the truck made all the pickups under these extreme conditions the same day. In the Connecticut area, they are using

in one place a 3500 gallon tanker trailer which makes a 178 mile round trip. Another Connecticut firm, Tranquillity Farms at Waterbury, is using a 750 gallon tank mounted on a straight frame truck. In the Maryland area we are using 1800 gallon straight truck tanks at present. This size of truck weighs about the same as the present can trucks and is able to reach the dairy houses under some difficult barnyard and lane conditions. When additional tanks are installed, it is planned to make two loads per day with these tank trucks. Since the routes will operate within a 35 mile radius of Washington, D.C., and present experience shows that it takes less time to pick up milk this way than with cans, this is entirely practical. About January 1, a 1500 gallon tank truck will be operating within a 20 mile radius of Frederick, Maryland. It is planned to pick up 3 loads a day with this tank. A smaller tank is being used as there are some extremely bad lanes and roads to cover.

The tanker trucks are supplied with compartments that hold the pumpout pump and sample trays. To transfer the milk from farm to tanker a Tygon plastic hose is used. The first step upon arriving at the farm is for the driver to check the milk for quality by checking the odor or, in some cases, actually tasting the milk. The next step is to insert the calibration stick to determine the amount of milk in the tank. After referring to the calibration chart, a weigh slip, in duplicate is made out, one being left with the producer. The temperature of the milk is also entered. The agitator is then started and, in the meantime, the pumpout hose connection is made. When this is completed the milk is ready for sampling. Milk is then transferred to the tanker by the pump on the truck. A cap is placed on the end of the hose, the tank rinsed out, and the driver is on his way. Total time at farms varies from 6 to 15 minutes, depending on size of tank, sampling and other matters which may come up for discussion when the driver is at the farm. This system of milk handling obviously offers many advantages to the producer, hauler and processor.

The chief advantages to the Producer are the following:

1. Increase in milk yield by elimination of the inevitable can stickage losses. Anyone who has observed modern can dumping equipment realizes that considerable milk is lost when cans are emptied at the weigh scale. This amount varies from a half pound to a pound and a half per can depending on the can dumping procedure. The can drippings represent an economic loss to the farmer as well as a loss to the processor. The increased yield in milk is a result of the elimination of the actual weight loss as well as an improvement in the butterfat test. Fat stickage to the shoulders and lids of milk cans result in a greater percentage of fat loss than actual milk solids.
2. Elimination of milk losses due to accidental spillages between farm and dairy as well as can runover at the milking time.
3. Elimination of much of the hard work at milking time. Bulk system actually saves man hours of labor connected with the milking operation.
4. Elimination of milk cans. Saving in replacement costs.
5. The Bulk Method frequently results in a reduction of the hauling rate. The amount of the reduction depends on local conditions. In the Maryland area rates have been reduced from 24 to 20 cents per hundred weight.

At Edisto Farms, Columbia, S.C., the rate was reduced from 35¢ to 20¢ per cwt.

6. There is usually a saving in the electric bill with the producers cold wall tank system of cooling milk. Users report savings from a \$1.00 up to \$8.00 per month, depending upon the amount of milk shipped.

7. The producer sells his milk in his own milk house, thus eliminating controversy over milk weights. The producer likes this angle very much.

8. Butter fat sampling is made under ideal conditions. The present method of sampling in weight cans is not accurate. Some days the sample may favor the producer and other days the plant.

9. Better quality milk is produced as a result of the faster cooling and colder storage on the farm. Producers report aeration during cooling helps remove odors.

10. When building a new milk house, a smaller building is required. It is possible to increase production using present dairy house as the producer tank takes up much less room and there is no need for can rack space.

The advantages to the hauler are:

1. Does away with all of the hard work of handling milk cans. As Nip Milloy, milk driver at the Green Valley Farms says - "The hardest job is driving the truck."

2. Makes it possible to use older men on the routes and also men with lesser physical qualifications than required for can truck operation. It is easier to maintain personnel on the tank routes than on the can routes.

3. Bigger pay loads are possible with the tank trucks.

The advantages to the dairy are as follows:

1. Better quality milk will be received due to the faster cooling and storage in the producers cold wall tank.

2. Colder milk will be received at the dairy, thus making a saving in refrigeration.

3. The bulk system eliminates can washing, receiving and sampling operation.

4. On some dairies it would be possible to eliminate all receiving room equipment. This is the case at Green Valley Farms Dairy where the milk is pumped direct from the tank truck into the pasteurizing vat.

5. Elimination of the can washer helps solve the sewage problem from the can rinsings. This is becoming increasingly important in some States.

6. It would be entirely possible with the bulk system to eliminate receiving plants in the country. Milk could be picked up on the farms and brought in direct, thus eliminating the investment in equipment and the expense of operating receiving stations.